

1963 TOBACCO INFORMATION

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FLUE-CURED TOBACCO SUPPLY AND DEMAND SITUATION FOR YOUR INFORMATION AND STUDY

Cigarette output in the past fiscal year was approximately 2.6 percent above the preceding year. However, use of flue-cured tobacco in the past few years has not kept pace with increases in cigarette output. This is due largely to: (1) displacement of tobacco by filter plugs as filter tip cigarettes took over about 55% of the market; (2) more complete utilization of tobacco leaves in the form of sheet tobacco and processed stems; (3) a decrease in size of some cigarettes; and (4) an increased use of oriental tobacco. In 1961, 10.3 percent of the unstemmed-processing weight of tobacco for cigarettes was oriental, compared to only 6.0 percent in 1950.

Exports of flue-cured tobacco during the marketing year ending June 30, 1962, totaled 432 million lbs., farm weight--about 53 million pounds below the previous year. In the year ahead, exports are expected to be back up to a more normal level. Negotiations of the United Kingdom on entering the Common Market and the "health scare" have created some uncertainty. The "health scare" temporarily reduced tobacco consumption, but the loss has about been regained. Carry-over, plus estimated 1963 production of flue-cured tobacco, is 3,590 million pounds. This is 2.9 times the annual disappearance. A 2 1/2 year supply is considered normal.

U. S. Flue-Cured Tobacco, All types; Acreage, Yield, Production, Stocks and
Disappearance, 1952-63

Marketing Year	Acreage Harvested 1,000 Acres	Yield Per Acre Pounds	Production	Stocks July 1 Million Pounds	Disappearance		
					Total	Exports	Domestic
1952-53	1,111.3	1,229	1,365.3	1,730.8	1,244.2	416.6	827.6
1953-54	1,021.8	1,245	1,272.2	1,851.9	1,209.0	431.3	777.7
1954-55	1,042.2	1,261	1,314.4	1,915.1	1,173.0	428.8	744.2
1955-56	990.7	1,497	1,483.0	2,056.6	1,281.3	553.0	728.3
1956-57	875.3	1,625	1,422.5	2,258.3	1,169.5	465.1	704.4
1957-58	662.7	1,471	975.0	2,511.3	1,178.2	441.3	736.7
1958-59	639.4	1,691	1,081.0	2,308.1	1,178.7	442.7	736.0
1959-60	693.3	1,559	1,080.7	2,210.4	1,185.0	419.2	765.8
1960-61	691.8	1,808	1,250.6	2,106.1	1,266.6	474.6	792.0
1961-62	698.5	1,801	1,257.9	2,090.1	1,266.9	485.4	781.5
1962-63	729.8	1,930	1,408.4	2,081.1	1,207.9	431.9	776.0
1963-64 Est.	693.6	1,916	1,308.9	2,281.6	1,270.0	460.0	800.0

Stabilization Receipts & Stocks 1952-63				Cigarettes Manufactured in U. S. 1952-63 Millions of Cigarettes	Tobacco Used in U. S. by Types Years 1952 - 1963			
Total Receipt	% of Crop	Under loan end of Mkt. yr. Mil. lbs.			F. C. Mil. lbs.	Burley Mil. lbs.	Maryland Mil. lbs.	Imported* Mil. lbs.
1952	165.0	11.0	254	436,567	686	385	23	76
1953	151.4	10.7	330	413,604	675	387	23	77
1954	130.3	8.9	352	407,776	625	364	21	77
1955	299.0	18.7	581	416,849	621	366	21	80
1956	320.0	20.9	674	433,919	610	371	21	85
1957	107.8	9.9	631	449,109	610	368	18	88
1958	144.9	12.3	680	479,530	634	374	18	100
1959	55.3	4.7	561	506,127	635	376	17	109
1960	51.8	3.8	539	518,031	651	389	17	116
1961	70.3	5.2	375	529,883	674	403	18	125
1962	237.0	14.6	574	543,687	663	412	17	126
1963 Est.	240.0	17.5	680	544,000				

*Represents Aromatic Tobacco.

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ESTIMATED ACREAGE & PRODUCTION OF LEAF TOBACCO (ALL TYPES) IN SPECIFIED COUNTRIES (Farm Sale Weight)

	Acreage Harvested				Production			
	Average	1958	1959	1960	Average	1958	1959	1960
	1950-54	1000	1000	1000	1950-54	1000 lb.	1000 lb.	1000 lb.
	acres	acres	acres	acres	1000 lb.	1000 lb.	1000 lb.	1000 lb.
Canada	109	134	129	134	147,552	197,302	170,255	197,237
Brazil	397	447	449	481	268,919	307,983	277,812	324,076
Rhodesia & Nyasaland	298	378	392	348	145,952	193,764	231,364	258,184
China	1,418	1,890	1,915	1,963	1,396,000	1,693,000	1,750,000	1,815,000
India	849	872	897	934	568,316	531,309	584,640	629,440
Indonesia	345	411	474	450	145,322	147,135	187,400	166,511
Phillipines	109	209	225	277	54,407	109,349	114,020	139,734
Thailand	96	152	151	150	34,793	57,805	64,886	62,939
U. S. A.	1,690	1,078	1,151	1,149	2,184,036	1,736,418	1,797,087	1,951,582

FLUE-CURED TOBACCO: FREE WORLD PRODUCTION MAJOR PRODUCING COUNTRIES
Average 1950-54; Annual 1955-62

Year	U. S. A. mil. lbs.	Rhodesia Nyasaland mil. lbs.	Canada Mil. lbs.	India mil. lbs.	Others mil. lbs.
Av. 1935-39	864	28	55	27	-
Av. 1950-54	1332	117	138	102	349
Annual:					
1955	1483	133	118	128	512
1956	1423	178	149	139	569
1957	975	149	152	130	615
1958	1081	156	181	105	656
1959	1081	195	152	137	669
1960	1251	222	206	157	662
1961	1258	237	195	155	724
1962	1372	234	181	164	686

ESTIMATED FLUE-CURED EXPORTS BY MAJOR EXPORTING COUNTRIES
(By calendar year periods in million pounds, export weight)

Country	1947-51	1952-54	1955-57	1958-60	1961	1962
Canada	20	33	37	33	37	46
Rhodesia						
Nyasaland	72	98	119	143	183	190
India	40	53	78	74	69	112
Communist China	1	23	100	98	40	20
Others	11	23	31	31	35	43
Total Foreign	144	230	365	380	364	411
Total U. S.	388	379	431	394	403	377
Percent U. S.	73	62	54	51	53	48

QUALITY OUTLOOK

Simply talking about quality, production and marketing practices and the failure of the other group to make improvements will not get the job done. All concerned parties must do their part. Tobacco quality and cooperation of interested groups improved in 1963.

The agricultural, industrial and allied groups involved in tobacco must form an agribusiness partnership. They must work together to bring about improvements needed in all areas of the tobacco program.

1. Tobacco prices paid by the companies need to realistically reflect desirable and undesirable characteristics of tobacco presented at the market place. This is true for all buyers. Too frequently, market prices ignore mixed grades, pale, toady, slick tobacco, thread, large hands, etc. Yet, these are things often criticized by buying interests.
2. The tobacco grading system needs to describe the quality characteristics of each basket of tobacco. The grade should identify desirable and undesirable characteristics that are important to the trade and consumer. Too frequently, mixture, thread, large hands, slick, toady, pale tobaccos may not be identified as such.
3. The price support program needs to reflect desirable and undesirable characteristics of tobacco. The support price has a great deal of influence at the market. It is just as important for the price supports to encourage desirable quality, good handling, etc., as it is for the buyers to do so.
4. The production control program needs to be as realistic and as accurate as possible in line with effective supply and demand in the domestic and foreign market. We must be aware of the effect on our own industry by quality, price and production costs of tobacco produced in foreign countries and of regulations, laws and tariffs in importing countries.
5. The tobacco warehousemen have very important roles and responsibilities in a cooperative effort to improve and build the tobacco program. Their support of a coordinated effort is important.
6. North Carolina State needs to supply as much up-to-date information on tobacco as possible through its basic and applied research. This information needs to be passed on by Extension and all educational programs to the farmers, to all segments of the tobacco industry, and to the people in general.
7. Tobacco farmers need to utilize the proven production and marketing practices to produce the most desirable quality as efficiently and economically as possible. The grower needs to have pride in the quality and appearance of his tobacco. Satisfaction the consumer will get from the use of his tobacco also must be considered. This calls for selection of proven varieties, sound cultural practices, chemicals, and curing and marketing practices that will produce a product which will provide maximum satisfaction in the domestic and foreign trade. A sound, healthy growing industry cannot be built on "what we can get by with" at the farm, market or in the processing plant.
8. The absence of a describable standard or measure of quality that is supported by market price, the grading system and price supports confuse the grower, the plant breeder, the research and extension workers.

Volume, quality and price are important tools available to growers to overcome foreign competition in tobacco and gain a fair share of the increase in export trade.

RESULTS OFFICIAL TOBACCO VARIETY TEST - 1963 - Average for Whiteville, Rocky Mount, Clayton, Oxford and Reidsville

Varieties	Yield		Value		Qual. Index	Suckers per plant		No. of leaves per plant	Height of Plant (in.)	Days to Flower	Nic. %	Ratio N/Nic.	Resistance			
	Lbs/A	2016	\$/A	Index-1/		Ground	Leaf Axil						BS	GW	FW	RK
McNair 20	2016	1166	58.08	3.2	1.5	26.7	17.2	39	49	4.18	.63	H	S	H	-	
Hicks	2056	1219	59.27	3.3	2.8	28.9	16.1	39	47	4.12	.63	S	S	L	-	
McNair 12	2191	1322	60.50	3.5	1.5	23.3	18.0	39	52	3.48	.74	M	H	L	-	
Coker 319	2248	1355	60.40	3.4	1.9	27.5	18.8	40	53	3.60	.76	M	L	H	-	
Sp. G-19	2251	1268	56.39	3.8	2.9	28.5	20.3	41	54	4.11	.64	L	S	M	-	
McNair 30	2257	1307	58.08	3.5	1.7	25.5	16.9	41	50	4.01	.65	M	S	M	-	
N.C. 95	2295	1351	58.88	3.4	2.5	25.2	18.7	42	53	3.89	.65	H	H	H	H	
Sp. G-10	2311	1349	58.54	3.6	.8	22.8	19.4	44	52	3.80	.67	H	L	S	-	
Reams 266	2325	1352	58.31	3.6	3.5	23.8	19.6	46	55	3.43	.72	M	H	H	-	
C-187-Hicks	2399	1439	60.18	3.6	4.4	25.6	18.9	44	54	3.27	.76	H	M	M	-	
Sp. G-3	2404	1367	56.98	3.9	.8	26.9	18.3	43	54	3.60	.67	M	S	S	-	
Bell 29	2409	1292	54.15	3.7	1.1	22.2	17.6	45	53	3.42	.75	M	M	H	-	
Sp. G-5	2449	1448	59.29	3.7	1.0	25.3	19.2	43	54	3.35	.73	M	S	M	-	

2/ Disease resistance - a relative rating based on regional data for 1 or more yrs. and assigned by a sub-committee of the Regional F.C. Variety Evaluation Committee. H = High resistance; M = Moderate; L = Low; S = Susceptible; BS = Black Shank; GW = Granville Wilt; FW = Fusarium Wilt; RK = Root Knot.

RESULTS OF OFFICIAL TOBACCO VARIETY TEST - AT INDIVIDUAL LOCATIONS - 1963

(The above average of 5 locations is the more reliable indication of the relative performance of varieties. The following data is for those who want to compare the 5 location average with that of a given Station.)

Variety	Whiteville				Clayton				Rocky Mount				Oxford				Reidsville			
	Yield Value Index				Yield Value Index				Yield Value Index				Yield Value Index				Yield Value Index			
	Lbs/A	\$/A	\$/Cwt.		Lbs/A	\$/A	\$/Cwt.		Lbs/A	\$/A	\$/Cwt.		Lbs/A	\$/A	\$/Cwt.		Lbs/A	\$/A	\$/Cwt.	
McNair 20	2319	1499	65.22		1570	990	63.07		1909	1045	54.93		2120	1280	60.42		2200	967	45.82	
Hicks	2498	1669	67.34		1603	1074	66.76		1807	1093	59.72		2273	1301	57.75		2115	997	48.07	
McNair 12	2197	1422	65.55		1885	1167	62.02		2385	1459	61.09		2145	1242	57.64		2405	1376	57.48	
Coker 319	2448	1679	68.38		1755	1076	61.31		2323	1478	63.96		2213	1338	60.39		2528	1289	49.79	
Sp. G-19	2346	1426	60.51		1822	1088	59.59		2238	1249	55.72		2302	1241	54.12		2543	1322	53.08	
McNair 30	2439	1676	65.93		1822	1148	62.64		2062	1145	55.83		2383	1370	57.47		2435	1163	48.01	
N.C. 95	2460	1587	64.57		1908	1161	60.89		2402	1392	58.01		2282	1268	55.63		2401	1327	52.92	
Sp. G-10	2419	1575	64.74		1947	1217	62.62		2299	1319	57.39		2548	1437	56.64		2290	1197	49.75	
Reams 266	2388	1553	65.57		1873	1118	59.71		2281	1276	55.94		2494	1414	56.52		2619	1406	53.61	
C-187-Hicks	2405	1579	65.48		1860	1164	62.53		2536	1486	58.55		2601	1542	59.26		2611	1502	55.88	
Sp. G-3	2551	1662	64.93		1953	1186	60.73		2466	1424	57.51		2515	1347	53.46		2550	1232	48.47	
Bell 29	2557	1587	61.59		1908	1173	61.49		2313	1213	52.61		2503	1354	54.40		2746	1078	42.09	
Sp. G-5	2638	1763	66.25		2035	1272	62.56		2463	1497	60.72		2426	1356	56.21		2705	1456	52.25	

1/ Value based on 1963 average auction price on gvt. grade basis - all belts through October 3, 1963.

Rainfall - Adequate at Whiteville, dry early at Clayton, dry early at Oxford but fair amount of water including irrigation, very dry at Rocky Mount and Reidsville. Reidsville test on very fertile soil and over-fertilized for season.

1963 NITROGEN FERTILIZATION TESTS

<u>Treatment</u>	<u>Yield/A</u>	<u>Value/A</u>	<u>Price/Cwt.</u>
10# N. less than recommended	1905	1132	59.45
Recommended rate N.	2186	1314	60.11
10# N. more than recommended	2096	1253	59.76

These three locations had little or no leaching rain.

<u>Treatment</u>	<u>Yield/A</u>	<u>Value/A</u>	<u>Price/Cwt.</u>
10# N. less than recommended	1706	1033	60.55
Recommended rate N.	1752	1053	60.10
N & K ₂ O adjusted for leaching	2037	1248	61.24

These three locations had an appreciable amount of leaching rains.

At the locations where little or no leaching rain occurred, the recommended rate of fertilizer (preplant and nitrogen sidedressing) based on soil tests and depth of topsoil gave the best yield and acre value. The 10# N. above recommendation lowered yield and value, but on the farms which had a considerable amount of leaching and reasonable adjustments of nitrogen and potash were made, the adjusted plot had the highest yield, acre value and price.

From this and previous years' work, it seems that adjustments in nitrogen--and possibly potassium--should be made in the form of additional sidedressing when heavy rains or extended wet periods cause severe leaching of these nutrients below the normal root zone. The coarse and deeper sandy soils seem to leach more easily than the heavier and more shallow soils. Extended heavy rainy periods, when the soil is already too wet to plow, appear to cause more leaching than heavy rains which keep the soil wet for a short period. Fertilizer adjustments for leaching seem to be more important if leaching occurs during the early part of the growing season than if it occurs later in the season. Also, heavier adjustments should be made if the leaching occurs early in the season. Adjustments should be made as soon after the leaching occurs as possible. For additional information on fertilizing tobacco, see Extension Circular No. 212.

FOLIAR vs. SOIL FERTILIZATION TESTS - 1963 (8 Trials on Tobacco Farms)

All plots fertilized on basis of soil test and depth of topsoil

<u>Treatment</u>	<u>Method of application</u>	<u>Additional Nitrogen</u>	<u>Yield/A</u>	<u>Value/A</u>	<u>Price/Cwt.</u>
Check	--	0	2336	1355	58.01
4 appl. 10-20-10(6 gal.)	Foliar spray	6.6.	2396	1396	58.27
2 appl. 10-20-10(6 gal.)	Foliar spray	6.6	2387	1393	58.38
44# 15-0-14	Soil (solid)	6.6	2412	1416	58.72

4 applications--first, 14 days after planting; 2nd, 4 weeks after planting; 3rd, at early button; 4th, at first priming.

2 applications--first, 4 weeks after planting; 2nd, at early button.

Solid application at 4 weeks after planting.

FERTILIZER PLACEMENT FIELD TESTS 1961-63
(30 Trials on Tobacco Farms)

Preplant fertilizer rate application based on soil test.

<u>Treatment</u>	<u>Yield/A</u>	<u>Value/A</u>	<u>Price Cwt.</u>	<u>Replants per acre</u>
1. One band deep	2012	1251	62.18	545
2. Two bands (at trans-planting)	2068	1299	62.81	556
3. One band shallow	1932	1214	62.84	5,089
4. Broadcast	1946	1211	62.23	1,047

The number of replants needed in the "one band shallow" plot shows that fertilizer injury can certainly be a problem. The fertilizer in this plot was applied similar to the system used on many farms. In the 30 tests, the plot which was fertilized in two bands and transplanted at the same time so that the plants were set between the bands gave the best results. The "one band deep" (3" to 4" below the roots after transplanting) was the second best treatment. The broadcast treatment gave about twice as much fertilizer injury, based on replants needed, as the deep application or two bands. Also, the broadcast fertilizer plots tended to show more yellowness than the others which indicates less efficient use of the nitrogen.

SPRING SUBSOILING FIELD TESTS - EFFECT ON TOBACCO - 1961-63
(25 Trials on Tobacco Farms)

<u>Treatment</u>	<u>Yield/A</u>	<u>Value/A</u>	<u>Price/Cwt.</u>
Not subsoiled	2021	1284	63.53
Subsoiled	2084	1324	63.53
Subsoiled - 1/2 fertilizer at subsoiled depth	2088	1335	63.94
Subsoiled - 500# lime and 500# superphosphate at subsoiled depth	2120	1351	63.73

SPRING SUBSOILING FIELD TESTS 1963 - 5 Trials

<u>Treatment</u>	<u>Yield/A</u>	<u>Value/A</u>	<u>Price/Cwt.</u>
Not subsoiled	1890	1173	62.03
Subsoiled	2133	1346	63.08
Subsoiled - 1/2 fertilizer at subsoiled depth	2110	1321	62.61
Subsoiled - 500# lime and 500# superphosphate at subsoiled depth	2200	1380	62.72

Considering the 25 tests conducted over a three-year period, there tended to be small increase in yield and acre value from subsoiling. In these 25 comparisons there were cases in which subsoiling increased yield and others which decreased yields. In 30 comparisons of subsoiling vs. no subsoiling for a 3 year period, considering \$50 per acre as being a difference, in 10 cases there was no difference, in 13 cases there was an increase and in 7 cases there was a decrease. These differences seem to be associated with soil type and available moisture. For example, the 5 tests in 1963 were grown under moderately dry to dry conditions and in each test subsoiling gave an increase in acre value of \$50 or more or an average increase of \$170 per acre. At some locations in other years, especially under wet conditions, there have been substantial decreases from subsoiling.

To date we have not been able to measure any consistent increases in yield or price from placing a part of the fertilizer at the subsoiled depth as compared to placing all of it at the normal depth.

Considering the averages of the 1963 tests and the 25 tests (1961-63), there was a slight increase in yield and value when an additional 500# lime and 500# superphosphate per acre were applied at the subsoiled depth. This increase was not consistent at all locations, which could indicate that some soils were deficient in lime or phosphate, or both. The tobacco may have responded to lime and phosphate without subsoiling.

TOPPING & SUCKERING FIELD TESTS-EFFECT ON YIELD, VALUE & SUCKER CONTROL
OF TOBACCO - 1963
(17 Trials on Tobacco Farms)

<u>Treatment</u>	<u>Yield/A</u>	<u>Value/A</u>	<u>Price/Cwt.</u>	<u>No. of suckers on 10 plants</u>	
				<u>Under 6" -</u>	<u>Over 6"</u>
Not suckered	1752	1040	59.37		
Hand suckered	2063	1268	61.47		
6 pts. MH-30, at full bloom stage	2192	1369	62.43	28	16
Experimental A	2290	1449	63.25	15	15
Experimental B & C	2117	1322	62.46	22	26

In these tests suckering by hand gave substantial increases in yield, price and acre value over non-suckered tobacco.

Under the conditions of these tests, MH-30, when used at the rate of 6 pints per acre and applied at the full bloom stage, gave an increase in yield, price per pound and acre value compared to the plots which were hand-suckered. Possibly because of the dry weather conditions at many of the locations, the sucker control on some of the MH-30 treated plots was rated fair to poor.

Experimental A, B and C are experimental materials that have shown promise as potential sucker control chemicals.

Experimental A is a contact-like material which was applied as a spray. In most tests, this material was applied twice, but in some, only one application was used. In these tests it gave a little better sucker control than MH-30 and slightly more yield, value and price. In some cases there was some slight leaf burn of small tender top leaves associated with this treatment. In some cases, sucker control weakened as the season progressed.

Experimental B and C are systemic type materials which were applied as sprays. In these tests, they did not control the suckers as well as MH-30 and the yield and value from these treatments were not as high as from MH-30.

EFFECT OF WINTER COVER CROP ON YIELD & VALUE OF TOBACCO 1960-63
12 Trials on Tobacco Farms (planted in continuous tobacco)

<u>Treatment</u>	<u>Yield/A</u>	<u>Value/A</u>	<u>Price/Cwt.</u>
No cover crop	2005	1281	63.89
Small grain winter cover	2082	1337	64.21
Small grain winter cover - 100#/A 10-10-10 2034		1302	64.01

As would be expected there were differences from one location to another and from one year to another. An average for the 12 trials over a period of 4 years the cover crop tended to give a slight increase in yield and acre value. The fertilizer applied to the cover crop did not increase the tobacco yield. In fact, the extra fertilizer tended to lower returns.

CHEMICAL WEED CONTROL FIELD TESTS 1963
(17 Trials on Tobacco Farms)

<u>Treat.</u>	<u>No. of Comparisons</u>	<u>Yield/A</u>	<u>Value/A</u>	<u>Price/lb.</u>	<u>Degree of Weed Cont.</u>	<u>Rate/A (Active)</u>	<u>Method of Application</u>
Check	-	100	100	100	0	-	-
Dymid	15	101	102	101	87	4	Sprayed after transplanting
Treflan	17	101	100	99	88	1	Sprayed & roto-tilled before transplanting
Dacthal	15	102	101	99	92	10	Sprayed & roto-tilled before transplanting
Tillam	17	100	98	98	70	3	Sprayed & roto-tilled before transplanting

There were no visible affects on the growth and development of the tobacco in any of the plots.

All plots in most tests were cultivated 2 to 3 times.

The chemicals had no measured affect on yield, value or price.

The most obvious weed control for the 4 materials was crabgrass and water grass. All materials, with the possible exception of Tillam, gave practical control of crabgrass. Tillam gave a noticeable reduction in nutgrass at one location until about lay by time. None of the materials gave much, if any, control of cocklebur, bermuda grass, ragweed or morning glory.

Keep in mind that these tests have been conducted only one year and cannot be considered conclusive. These tests did not include variations in cultivation with and without chemical weed control.

Some of these chemicals may have adverse affect on small grain following tobacco.

SOME PRODUCTION PRACTICES THAT AFFECT QUALITY THAT GROWERS CAN USE TO ADVANTAGE

1. Select varieties that can be expected to most frequently produce grainy, good-textured tobacco. Avoid those that tend to produce a high percent of slick, pale, toady and starchy tobacco.
2. Use adequate fertilizer--enough under the row to get the crop off to a good start (600 to 800#/A) --but not enough to cause serious fertilizer injury. The additional fertilizer needed for a normal season should be sidedressed early - as soon as possible after transplanting or, if band placement equipment is available, apply the fertilizer recommended for a normal season at transplanting. Thereafter, adjust the nitrogen and potash to fit the rainfall pattern. If additional fertilizer is needed as a result of leaching rains, the earlier it is applied the greater the response and the less likely it is to produce the effects associated with over fertilization.

Washed out, prematurely starved tobacco may be slick, low in oil, paperish, tight-faced, poor-textured, gray and pale in color. Excessively fertilized tobacco for the season may be fleshy, oily, thick or, under certain conditions, it may be bony and chaffy. Have the soil tested and ask for magnesium analysis. Be sure that there is adequate magnesium in the soil, especially in a wet season and on sandy soil. Tobacco grown on magnesium-deficient soil has been observed to be dull, dingy in color and lifeless and paperish in texture. We would

do well to recognize that the balance of nutrients in the soil is important as well as the balance of chemical constituents in the cured leaf. We should use soil tests to learn more about the nutrient balance in our tobacco soils.

3. Avoid the use of excessive ammonium nitrogen. At least 35% of the nitrogen in the mixed fertilizer should be in the nitrate form. If the amount of nitrate nitrogen in the soil is low and there is an excess of ammonium nitrogen, the plant will take up excessive ammonium nitrogen. High amounts of ammonium nitrogen in the leaf decrease growth and the percentage of calcium, potassium and magnesium in the tobacco leaf. It has been observed that tobaccos that have absorbed a high percent of N. in the ammonium form are dull and dingy in color in the cured leaf.
4. Avoid the use of excessive chlorine. Some chlorine (about 20 to 40# per acre) is considered beneficial to yield, color and elasticity. Much more than this tends to produce tobacco that is dull, dingy, soggy, low in filling power and has poor fire-holding capacity. This is another reason for using reasonable rates of mixed fertilizer. For example, 2,000 pounds of fertilizer containing 3% chlorine will add 60 pounds of chlorine to the soil.
5. Avoid the use of excessive irrigation water - too much and too often tends to produce pale, slick, washed-out tobacco that is low in oil, nicotine, aroma and flavor and high in sugar.
6. Use proper spacing and height of topping - 120,000 to 140,000 leaves per acre - about 5,500 to 7,500 plants per acre. Top about 17 - 20 leaves. If the closer spacing is used, the lower topping should be used. An increase or decrease in leaf number per acre by higher or lower topping seems to affect the nicotine level more than an equivalent increase or decrease in leaf number by closer or wider spacing. Higher topping and close spacing usually produces thinner tobacco which is lower in nicotine and higher in sugar. Excessively higher topping results in chaffy tobacco.
7. If MH-30 is to be used, treat at the proper stage of plant maturity, do not use excessive rates, and let MH-30 treated tobacco get well-ripened before harvesting. Thorough ripeness tends to reduce adverse effects of MH-30 on the chemical and physical properties of the cured leaf.
8. Harvest mature and ripe tobacco. Ripe tobacco is easier to cure to an orange color, good grain and good texture. Immature and unripe tobacco is frequently slick, paperish, pale to gray in color. Such tobacco tends to produce a harsh and irritating smoke. It has low filling power.
9. Use a reasonably slow curing schedule. Give the tobacco plenty of time to yellow and time for the starches to convert to sugar before setting the color and drying the leaf. Tobacco that is cured slowly has more of a ripe, orange color and grainy appearance. Tobacco that is cured too fast frequently has immature appearance and is more likely to show brown scald and off-color.
10. Avoid excessively high temperature in curing tobacco. Dry the stems at 160° to not over 170° F. insofar as possible. High temperature reddens the leaf and brings out effect of dry weather, over-fertilization and the cherry red characteristics. This throws the tobacco into KM grades.
11. Prepare tobacco properly for market. Separate the green, red, slick, toady and very dead tobacco from the ripe, grainy, desirable cigarette tobacco.

TOBACCO DISEASE CONTROL PRACTICES FOR 1964
Plant Pathology Information Note No. 106

Tobacco disease losses increased slightly in 1963, reducing the crop value by 3.67% and resulting in an estimated dollar loss of \$18,790,400. Some of the more common tobacco diseases and losses are presented below:

Tobacco Disease Losses - 1963

	Per Cent Reduction	\$ Loss
Nematodes	1.20	6,144,000
Black shank	0.70	3,584,000
Granville wilt	0.10	512,000
Mosaic	0.20	1,024,000
Fusarium wilt	0.01	51,200
Brown spot	1.10	5,632,000
Misc. Leaf Diseases	0.23	1,177,600
Misc. Root Diseases	0.10	512,000
Plant Bed Diseases	0.03	153,600
Total	3.67	18,790,400

Losses to root knot and other nematodes increased slightly in 1963. It is believed that dry weather during the middle and latter part of the growing season contributed to this increase. Black shank losses more than doubled. The increased loss was due mostly to three factors:

1) Level of resistance - Many growers used moderately-resistant varieties rather than high.
2) Rotation - Most damage occurred where tobacco followed tobacco. 3) Weather conditions - Most areas had adequate rainfall during the early part, and light rainfall during the middle and latter parts of the growing season. Wet weather favors black shank infection; drought favors disease expression. Most losses occurred where moderately-resistant varieties were used; therefore, losses to individual growers were small in most cases. Brown spot losses decreased, with only a few scattered reports of severe damage in certain varieties and in certain areas. Dry weather during harvest was largely responsible for these reduced losses.

If each grower would plan a complete control program, disease losses could be reduced in 1964. The following information may be of some help in planning a complete disease control program on your farm.

Disease Control In The Plant Bed

Black shank and nematodes can be controlled by using the methyl bromide treatment (liquid or vaporized). This is most important where susceptible varieties are used. Cyanamid alone controls neither nematodes nor black shank.

Blue mold, anthracnose and damping-off remain a threat to plant production and can be satisfactorily controlled by using any of the fungicides containing ferbam, zineb or maneb applied as spray or dust. Start treating with two applications per week when the plants are the size of a dime and continue through transplanting.

Disease Control In The Field

Black Shank is most effectively controlled by the use of disease resistant varieties and crop rotation. Since black shank attacks only tobacco, rotation with any crop will tend to reduce the level of this disease. But do not depend on rotation alone. On farms where the level of black shank is high and no rotation is used, only high resistance varieties should be planted. Moderately-resistant varieties may be used where the disease level is not high or where crops are rotated.

Granville wilt losses can be reduced by use of resistant varieties and crop rotation. Rotation with crops that are resistant to the Granville wilt bacterium can be expected to reduce the disease. Only a few crops are resistant: corn, redtop grass and soybeans are considered excellent; crabgrass and Rowan lespedeza, good; cotton, milo and sweet potatoes, fair. Do not use peanuts, weeds--especially ragweed--and most vegetable crops. For best results, use a three-or four-year rotation. Additionally, several resistant varieties are available. If Granville wilt is a critical problem, use only varieties with high resistance; varieties with moderate to low resistance should perform well on a long rotation.

Fusarium Wilt is controlled by use of resistant varieties and a rotation for nematode control, plus the use of a soil fumigant in fields where nematodes are a problem.

On many farms, more than one of these diseases (black shank, Granville wilt and Fusarium wilt) occur in the same field. Therefore, the grower must consider the disease problems present and the level of infestation in a field before selecting the variety to be used. The level of resistance of varieties to all three diseases is summarized below.

Information on Resistant Varieties - 1963^{1/}

Level of Resistance

Variety	Black shank	Granville wilt	Fusarium Wilt
Bell 29	Moderate	Moderate	High
Coker 111*	High	Susceptible	Low
Coker 319	Moderate	Low	High
McNair 20	High	Susceptible	High
McNair 30	Moderate	Susceptible	Moderate
Reams 61*	Moderate	Moderate	Low
Reams 266	Moderate	High	High
Speight G-5	Moderate	Susceptible	Moderate
Speight G-19	Low	Susceptible	Moderate
Coker 80F	High	Moderate	Moderate
Coker 187-Hicks	High	Moderate	Moderate
N. C. 75*	High	Low	Moderate
N. C. 95	High	High	High
Reams 51 ***	High	Low	Low
McNair 12	Moderate	High	Low
McNair 10*	Moderate	Low	Susceptible
Speight G-10	High	Low	Susceptible
Bell 16*	Moderate	Susceptible	High
Speight G-3	Moderate	Susceptible	Susceptible
Vesta 5*	Moderate	Susceptible	Susceptible
Bell 15**	Susceptible	Susceptible	Low
Hicks	Susceptible	Susceptible	Low
White Gold****	Susceptible	Susceptible	Low

^{1/} The relative ratings as to level of resistance are based on 1963 data obtained from N. C., S. C., Georgia and Virginia and data of previous years.

* Level of resistance based on 1962 data.

** Level of resistance rating based on 1958 & 1959 data.

*** Level of resistance rating based on 1961 data.

****Level of resistance rating based on information from variety demonstrations.

Nematodes are still a hazard in producing flue-cured tobacco. A complete nematode control program would involve use of crop rotation and certain winter management practices, also soil fumigation where the problem is critical.

1) Crop rotation has long been recognized as one of the best and most practical methods of nematode control. Results from a long-range crop rotation experiment conducted at the Oxford Research Station are presented below. These results suggest the value of crop rotation in reducing the incidence of root knot and increasing acre value.

Rotation	Root Knot Index	Value Per Acre	Increase Over Check
Tobacco-tobacco-tobacco-tobacco	98.3	844	
Tobacco-fescue-fescue-tobacco	24.5	1331	487
Fescue-fescue-tobacco-tobacco	85.0	1074	230
Swt. Pot. -tobacco-corn-tobacco	62.3	1313	469
Corn-tobacco-swt. pot. -tobacco	93.3	1250	406
Tobacco-lespedeza-corn-tobacco	63.0	1365	521
Lespedeza-corn-tobacco-tobacco	88.3	964	120

In planning a rotation, use crops that are resistant to one or both types of nematodes which attack tobacco and that will reduce the particular nematode that is causing most damage at the present time. These crops should be changed from time to time--rotate the rotation--to prevent the build-up of other types of nematodes. The following table shows the relative value of certain crops in reducing the two types of nematodes that attack tobacco:

Crops	Root Knot	Meadow
Small grains-weeds	Good	Good
Weeds	Good	Excellent
Fescue	Excellent	Excellent
Peanuts*	Excellent	Good
Cotton	Fair	Fair
Corn	Good	Poor
Milo	Good	Poor
Sudan Grass	Good	Poor
Sweet Potatoes	Poor	Excellent
Watermelons	Poor	Excellent
Rowan lespedeza	Excellent	Good

* Poor in peanut belt.

Best results are obtained with a long rotation--two to three years between tobacco crops. However, adequate control can be expected with a two-year rotation (one alternate crop between crops of tobacco). A two-year rotation may be adequate where the root knot problem is not severe or where soil fumigation is also practiced. In fact, a two-year rotation combined with soil fumigation will generally do a better job of nematode control than either practice used alone.

2) Winter management practices are highly effective in reducing nematode populations. For example, plowing out tobacco stubbles immediately after harvest may reduce nematode populations as much as 75 to 90 per cent. This practice alone will not give adequate nematode control, but supplements control obtained with crop rotation and soil fumigation.

3) Soil fumigation gives immediate nematode control. For best results, do a thorough job of preparing the land. Apply fumigant deep--14 inches from top bed or 8 to 10 inches from soil line. Provide a seal immediately following application with a high, wide bed for row treatment or dragging the field to firm the soil for broadcast treatment. Allow at least a two-week waiting period before transplanting. If heavy rains follow soon after application, open the bed for aeration. The use of a soil fumigant pays well, if needed. On the other hand, if no soil fumigant is needed, its use might reduce acre value.

The following table contains suggested rates and relative value of different fumigants for control of the two types of nematodes that attack tobacco:

Fumigant	Gals. Per Acre		Control of:	
	Row	Broadcast	Root Knot	Meadow
D-D, Vidden D & others (dichloropropene- dichloropropane)	10	20	Excellent	Good
Telone (dichloropropene)	8	16	Excellent	Good
EDB-85 (ethylene dibromide)	2 $\frac{1}{4}$	4 $\frac{1}{2}$	Excellent	Poor
Dorlone & others (dichloropropene plus ethylene dibromide)	6	12	Good	Good
Fieldfume, & others (dichloropropene- dichloropropane plus ethylene dibromide)	6	12	Good	Good
Penphene (tetrachlorothiophene)	3/4	1 $\frac{1}{2}$	Good	-

Penphene, a new soil fumigant for tobacco, has been in research and demonstration tests for the past three years. This fumigant contains 4 pounds of tetrachlorothiophene per gallon. The control of root-knot nematodes by Penphene has been variable, ranging from fair to excellent, but it should give satisfactory root knot control. Its effectiveness against meadow nematodes has not yet been determined. The following table contains information from several tests where Penphene was compared with Vidden-D and untreated check for root knot control:

Summary of Root-Knot Index Data
Soil Fumigation Experiments and Demonstrations, 1963

Location	Material: Rate/acre:	Treatment				
		Check	Vidden-D	Penphene		
		-	10 gals.	2 qts.	3 qts.	4 qts.
Duplin		86	7	17	8	-
Durham		91	18	29	68	-
Moore		69	23	20	17	-
Vance		70	31	75	21	-
Sampson*		100	31	96	93	88
Clayton*		70	14	32	-	6
Oxford*		98	54	82	-	44
Treatment - check comparison. Average reduction due to treatment			58	33	41	44
* Replicated experiments.						

Penphene Application recommendations are generally the same as outlined for other soil fumigants on tobacco with regards to land preparation, date of application, waiting period, depth of application, seal, etc. Best results have been obtained with 3 qts. (3 lbs.) per acre. Penphene mixes well with water. For row application, mix 3 qts of the fumigant with 9 1/4 gals. of water (10 gals. mixture) and apply at the rate of 10 gals. per acre. For broadcast treatment, use 1 1/2 gals. Penphene mixed with 18 1/2 gals. of water and apply at rate of 20 gals. of mixture per acre.

Slight stunting has been observed in some tests where rates higher than 3 lbs. or 3 qts. per acre were used as row treatment. On the other hand, fair control has been obtained with rates as low as 2 lbs. or 2 qts. per acre.

4) Control by Resistant Varieties would be of great value in a total nematode control program. N. C. 95 has an extremely high level of resistance to one of the most common forms of root-knot nematodes which attack tobacco, namely the Meloidogyne incognita group. Larvae of this nematode can enter the roots of the N. C. 95 variety, but the giant cells necessary for the larvae to feed do not form and the nematodes gradually starve. (When nematodes enter roots of a susceptible variety, giant cells are formed and gall development results.) When large numbers of root-knot larvae enter the roots of N. C. 95, some stunting results, even though the nematode does not become established. The root systems soon recover but, in the presence of high populations of the nematode, the stunting effect may persist throughout the season. Therefore, fields infested with high populations of nematodes should be fumigated even though a root-knot resistant variety, such as N. C. 95, is planted. In all tests, the root-knot index was very low where N. C. 95 was used, showing that the resistant variety is an excellent nematode-reducing crop and would behave like crotalaria or fescue in lowering root-knot infestations.

Brown Spot was considered the number 1 flue-cured tobacco disease problem in 1959, 1960, 1961 and 1962. Losses in 1963 were somewhat lower, but the disease is still considered a major problem. Brown spot is caused by a fungus generally regarded as a weak parasite, but it severely damages leaves of plants that are low in vigor. Consequently, any factor that tends to weaken plants usually results in increased damage from the brown spot disease. During wet weather the fungus that causes this disease produces enormous numbers of spores (or microscopic seed-like bodies) that are spread by wind and water.

Spray tests and demonstrations for brown spot control were conducted at all six tobacco experiment stations in 1963 and on farms in 10 counties. Results indicate that spraying with fungicides or treating with MH-30 reduced the incidence of brown spot and increased value in all tests. The results from demonstration-tests are presented in the following table:

Summary 4 Tests				Summary 6 Tests			
Treatment ^{1/}	Brown spot index	Value ^{2/}		Treatment ^{1/}	Brown spot index	Value ^{2/}	
		\$ Per acre	Increase(\$) over check			\$ Per acre	Increase(\$) over check
Check	34	938		Check	35	1085	
MH-30	30	1150	212	MH-30	31	1127	42
Maneb	12	1031	93	Dyrene	24	1186	101
Maneb + MH-30	15	1165	227	Dyrene + MH-30	18	1243	158
Maneb + MH-30 (special)	17	1139	202	Dyrene + MH-30 (special)	25	1179	94

1/ Maneb (manzate or Dithane M-22) and Dyrene spray were mixed at a concentration of 2 lbs. per 100 gals. of water and applied at the rate of 65 gals. per acre. First application applied at time of topping. Plots were sprayed once each week following priming, with exception of special treatment which was handled as follows: first application at time of topping; second application following 4th priming; third & fourth applications 1 week apart following the second. MH-30 was applied when 90% of plants were in full flower at the rate of 6 pints per acre. Check plots and those sprayed with either maneb or Dyrene alone were hand-suckered.

2/ Value data based on 3 tests; 1 test omitted because of extreme location effect.

Additional information is needed before fungicides can be recommended for control of brown spot. Tobacco sprayed with either fungicide needs to be tested extensively for residues, off flavor and aroma.

While there is no known method of brown spot control, here are a few practices that might help reduce loss to this disease: 1) Practice crop rotation. 2) Destroy tobacco crop refuse immediately following harvest. 3) Control other diseases, especially nematodes. 4) Use tolerant varieties if disease has been a major problem in years past. Varieties that have tolerance include N. C. 95, McNair 30, Speight G-5, Speight 31, McNair 10, McNair 12, N. C. 75, McNair 20, Coker 319, Hicks, Vesta 5 and Bell 15. 5) Increase priming rate when brown spot appears. Much spread of brown spot occurs from lower leaves to upper leaves. The severity

of attack in upper leaves may be reduced by priming lower leaves as soon as possible after the disease appears. 6) Proper fertilization. Loss caused by brown spot can be reduced by using proper amounts of a balanced fertilizer. 7) Spacing. Shaded leaves appear to be more severely damaged by brown spot than leaves receiving adequate sunlight. Therefore, proper spacing, 20-22 inches in drill and 3 1/2-4 ft. rows, should reduce losses.

Mosaic is one of our oldest known tobacco diseases. It is caused by a highly contagious virus that is spread by contact. Losses to this minor disease vary to some extent between seasons, but extensive loss is caused every year on a few farms. Recent research indicates that use of milk in any form at transplanting time will greatly reduce losses. Use the following method: Spray plant bed within 24 hours before pulling plants with five gallons of whole or skim milk or five pounds dried skim milk mixed with five gallons water per 100 sq. yds. Also, have workers dip their hands in whole or skim milk or a mixture of one pound dried skim milk to one gallon water every 20-30 minutes while pulling plants and dropping plants in transplanter.

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